Augmenting Space-Based-Soliton (SBS) Submarine Detection Systems with Improved Covert Mobile Sonobuoy Systems for High-Precision Fix on Quiet Adversary Submarines

25 March 2024
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Introduction

As we approach the 10th anniversary of the launch of NROL-67, we can take pride in the strides made toward creating a more complete picture of the sub-aquatic landscape.

Although revolutionary, space-based-soliton (SBS) systems are limited in terms of the accuracy of the positional fix generated and often requires augmentation with other systems in order to obtain an accurate fix, particularly when a missile submarine has "gone quiet" and has entirely deactivated its engines at the outset of a protracted loitering period.

In the opening stages of a conflict with a major power, sonobuoy networks such as SOSUS would be primarily targeted and cannot be relied upon in wartime. These buoys are in fixed, known positions and use active pings which are easily recognized as such by our adversaries. There exists a niche for re-conceptualized sonobuoy networks as naval warfare doctrine calls for, insofar as is possible, the minimization of the use of active sonar systems on fast-attack platforms. Should "quiet" platforms be hit with active pings by our own fast-attack assets with too great a frequency, an adversary may begin to ask questions about how it is that their quiet platforms were detected in the first place, potentially compromising the SBS system.

Abstract

As high-endurance, small-form-factor naval drone systems become more commonplace and as platform stealth can be anticipated to be substantially improved through the maritime utilization of PoMP systems as a means of propulsion, the decentralization and re-conceptualization of SOSUS should be a top priority for the Office of Naval Research.

The redesign of SOSUS must meet all of the following design criteria in order to be effective in a 21st Century naval battlefield:

1.) Sonobuoys must be masked both in terms of their own acoustic and physical profile as well as the acoustic signature of their active ping emissions as natural wildlife sc. whales.

2.) Sonobuoys must be mobile and their patterns of movement should match that of natural wildlife sc. whales.

3.) Sonobuoys must be propelled by quiet means, sc. PhOto-Magnetic Propulsion.

4.) Sonobuoys must be capable of periodically modulating their depth in a manner consistent with natural wildlife sc. whales.

5.) Sonobuoys must be capable of transmitting data to Naval Command without these emissions being detected in order to enable utilization of generated telemetry without compromise of the novel system.

6.) Whale sounds must be accurately emulated and must be varied in their frequency in such a way so as to ensure they are not identified as artificial repetitions of the same whale call.

Perhaps the most challenging aspect of this endeavor will be two-way communication with the Covert Mobile Sonobuoys (CMS) units using methods which ensure the emissions are not detected by adversary platforms. This could be feasibly achieved through the embedding of encoded information within subsequent "active pings" using analog encoding methods. The encoding of the telemetry generated from preceding pings being encoded within subsequent pings would fulfill the need for both singularization of the intonational qualities of the "whale calls" as well as provide a means for covertly conveying data to existing sub-aquatic listening stations/relays linked alternatively to ocean-floor fiber as well as to satellite via collimated beam.

Conclusion

Given the element of surprise, it is unlikely that adversary sonalysts will be listening for usual patterns of whale activity. This approach should enable the precision tracking of adversary submarines, even in a time of war with a major power and should help to preserve the element of surprise with regard to SBS systems.